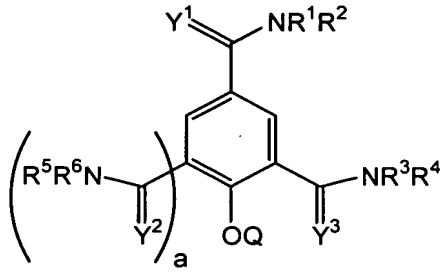
WHAT IS CLAIMED IS:

1. A compound having the structure:



wherein

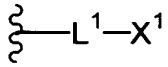
R^1, R^2, R^3, R^4 ,R^5 and R^6 are members independently selected from H, substituted or unsubstituted alkyl, substituted or unsubstituted heteroalkyl, substituted or unsubstituted aryl, and substituted or unsubstituted heterocycloalkyl, wherein a member selected from R^1 and R^2; R^3 and R^4; and R^5 and R^6, together with the nitrogen atom to which they are attached, optionally form a ring system selected from heteroaryl and heterocycloalkyl;

Y^1, Y^2 and Y^3 are members independently selected from O and $(H)_2$;

Q is a member selected from H, a protecting group and a cleaveable group; and

a is 0 or 1.

2. The compound according to claim **1**, wherein a member selected from R^1, R^3 and R^5 has the structure:

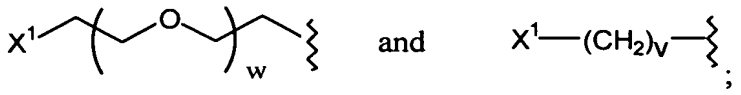


wherein

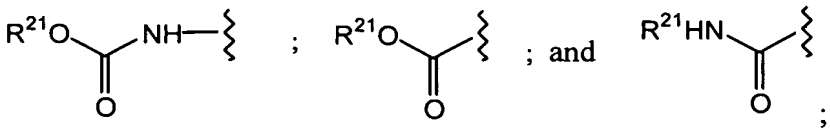
L^1 is a member selected from substituted or unsubstituted alkyl, substituted or unsubstituted heteroalkyl and substituted or unsubstituted aryl; and

X^1 is a member selected from protected or unprotected reactive functional groups and non-covalent protein binding groups.

3. The compound according to claim **2**, wherein a member selected from R^1, R^3 and R^5 is a member selected from:



X^1 is a member selected from:



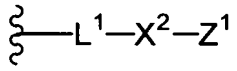
in which R^{21} is a member selected from H, substituted or unsubstituted alkyl and substituted or unsubstituted aryl;

v is an integer from 1 to 20; and

w is an integer from 1 to 1,000.

4. The compound according to claim **2**, wherein said non-covalent protein binding group is sulfonate.

5. The compound according to claim **1**, wherein a member selected from R^1, R^3 and R^5 has the structure:



wherein

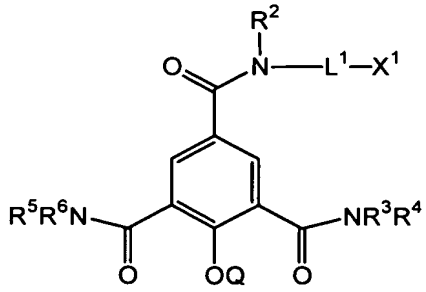
L^1 is a member selected from substituted or unsubstituted alkyl and substituted or unsubstituted heteroalkyl; and

X^2 is a linking member adjoining L^1 to Z^1; and

Z^1 is a member selected from carrier molecules and detectable labels.

6. The compound according to claim **5**, wherein said carrier molecule is a targeting agent.

7. The compound according to claim **2**, having the structure:



wherein

X^1 is a member selected from NH_2, SH, COR^7, $O(CH_2)_mZ^6$, $NHNH_2$ and $O(CH_2)_2(OCH_2CH_2)_sO(CH_2)_2Z^6$

wherein

R^7 is a member selected from H, OR^8, $OCOR^8$, NR^8R^9,

wherein

R^8 and R^9 are members independently selected from H, substituted or unsubstituted alkyl, substituted or unsubstituted heteroalkyl, substituted or unsubstituted aryl, substituted or unsubstituted heteroaryl and substituted or unsubstituted heterocycloalkyl;

Z^6 is a member selected from OR^{10}, $OCOR^{10}$, $NR^{10}R^{11}$

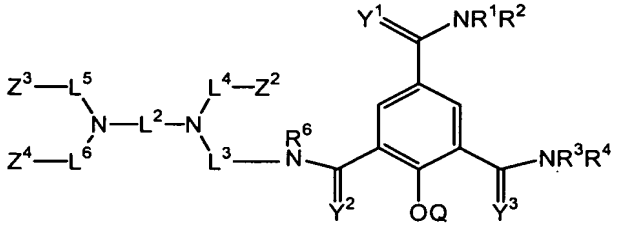
wherein

R^{10} and R^{11} are members independently selected from H, substituted or unsubstituted alkyl, substituted or unsubstituted heteroalkyl, substituted or unsubstituted aryl, substituted or unsubstituted heteroaryl and substituted or unsubstituted heterocycloalkyl;

m is an integer from 1 to 20; and

s is an integer from 1 to 1000.

8. The compound according to claim **1**, having the structure:



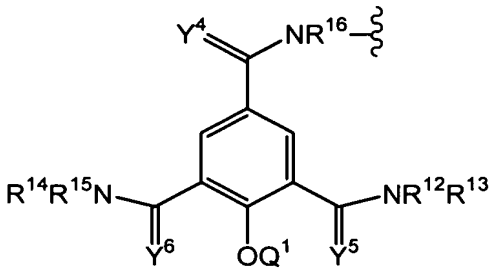
wherein

L^2 is a member selected from substituted or unsubstituted alkyl, substituted or unsubstituted heteroalkyl, substituted or unsubstituted aryl, substituted or unsubstituted heteroaryl, substituted or unsubstituted heterocycloalkyl;

L^3, L^4, L^5 and L^6 are members independently selected from a single bond, substituted or unsubstituted alkyl and substituted or unsubstituted heteroalkyl; and

Z^2, Z^3, and Z^4 are members independently selected from H, substituted or unsubstituted aryl and substituted or unsubstituted heteroaryl.

9. The compound according to claim **8**, wherein Z^2, Z^3, and Z^4 are members independently selected from substituted or unsubstituted pyridyl, substituted or unsubstituted salicylamidyl, substituted or unsubstituted phthalamidyl, substituted or unsubstituted terephthalamidyl, substituted or unsubstituted catechol and



wherein

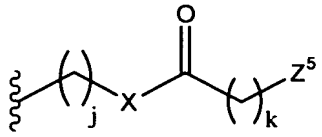
R^{12}, R^{13}, R^{14}, R^{15} and R^{16} are members independently selected from H, substituted or unsubstituted alkyl, substituted or unsubstituted heteroalkyl, substituted or unsubstituted aryl, and substituted or unsubstituted heterocycloalkyl, wherein a member selected from R^7 and R^8; and R^9 and R^{10}, together with the nitrogen atom to which they are attached, form a ring system selected from heteroaryl and heterocycloalkyl;

Y^4, Y^5 and Y^6 are members independently selected from O and $(H)_2$; and

Q is a member selected from H, a protecting group or a cleaveable group.

10. The compound according to claim **8**, wherein L^2 is a substituted or unsubstituted C_1-C_6 alkyl group.

11. The compound according to claim **1**, wherein at least one of R^1, R^3 and R^5 has the structure:



wherein,

Z^5 is a member selected from H, OR^{17}, SR^{17}, NHR^{17}, $OCOR^{18}$, $OC(O)NHR^{18}$, $NHC(O)OR^{17}$, $OS(O)_2OR^{17}$, and $C(O)R^{18}$;

R^{17} is a member selected from H, substituted or unsubstituted alkyl, and substituted or unsubstituted heteroalkyl;

R^{18} is a member selected from H, OR^{19}, $NR^{19}NH_2$, SH, $C(O)R^{19}$, $NR^{19}H$, substituted or unsubstituted alkyl and substituted or unsubstituted heteroalkyl;

R^{19} is a member selected from H, substituted or unsubstituted alkyl and substituted or unsubstituted alkyl;

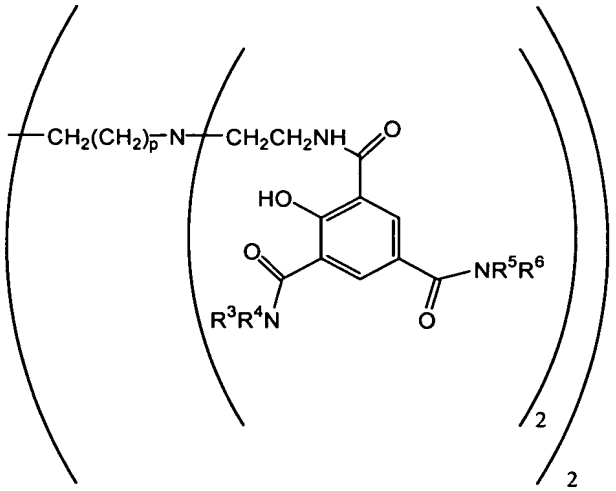
X is a member selected from O, S and NR^{20}

wherein

R^{20} is a member selected from H, substituted or unsubstituted alkyl and substituted or unsubstituted heteroalkyl; and

j an k are members independently selected from the group consisting of integers from 1 to 20.

12. The compound according to claim **1**, having the structure:

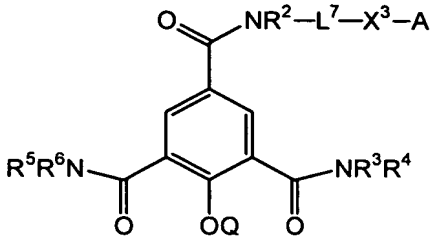


in which p is an integer from 0 to 2.

13. A polymer comprising a subunit having said structure according to claim **1**.

14. The polymer according to claim **13**, wherein said polymer is a biomolecule.

15. The polymer according to **1**, having the structure:



wherein

L^7 is a member selected from a single bond, substituted or unsubstituted alkyl and substituted or unsubstituted aryl; and

X^3 is linking member joining L^7 to A;

A is a carrier molecule.

16. The polymer according to claim **15** wherein A is a member selected from biopolymers, poly(amino acids), polyethers, polyimines, polysaccharides, dendrimers, cyclodextrins, pharmaceutical agents.

17. The polymer according to claim **16**, wherein said biopolymer is a member selected from polypeptides, nucleic acids and saccharides.

18. The polymer according to claim **17**, wherein said protein is a member selected from antibodies, enzymes, and serum proteins

19. A chelate of a metal ion comprising an organic ligand having said structure according to claim **1**.

20. The chelate according to claim **19**, wherein said metal ion is a lanthanide ion.

21. The chelate according to claim **20**, wherein said chelate is luminescent.

22. The chelate according to claim **19**, wherein said chelate is covalently attached to a carrier molecule.

23. A method for detecting enzyme in a sample, said method comprising:

(a) contacting said sample with a peptide construct comprising:

i) a peptide sequence, said sequence comprising a cleavage site for said enzyme;

ii) a complex according to claim **19** covalently bound to said peptide; and

iii) a quencher of light energy covalently bound to said peptide sequence, said quencher having an absorbance band overlapping an emission band of said complex,

wherein said peptide sequence conformation allows light energy transfer between said complex and said quencher when said complex is excited;

(b) exciting said complex;

(c) determining a fluorescence property of said sample; and

(d) comparing said fluorescence property from step (c) with a reference fluorescence property for said peptide construct, wherein said activity of said enzyme in said sample alters said light energy transfer, resulting in a change in said fluorescence property.

24. A method of determining the effect of a compound on enzyme activity, said method comprising:

(a) contacting a sample comprising said enzyme with a peptide construct comprising:

iii) a peptide sequence, said sequence comprising a cleavage site for said enzyme;

iv) a complex according to claim **19** covalently bound to said peptide sequence; and

iii) a quencher of light energy covalently bound to said peptide sequence, said quencher having an absorbance band overlapping an emission band of said complex,

wherein said peptide sequence conformation allows light energy transfer between said complex and said quencher when said complex is excited;

(b) exciting said complex;

(c) determining a fluorescence property of said sample; and

(d) comparing said fluorescence property from step (c) with a reference fluorescence property for said peptide construct, wherein said activity of said enzyme in said sample alters said light energy transfer, resulting in a change in said fluorescence property.

25. A method for detecting a target nucleic acid sequence, said method comprising:

(a) contacting said target sequence with a detector oligonucleotide comprising a single-stranded target binding sequence, said detector oligonucleotide having covalently linked thereto,

i) a complex according to claim **19**;

ii) a quencher of light energy having an absorbance band overlapping an emission band of said complex,

wherein said detector nucleic acid conformation allows fluorescence energy transfer between said complex and said quencher when said complex is excited;

(b) hybridizing said target binding sequence to said target sequence, thereby altering said conformation of said detector oligonucleotide, causing a change in a fluorescence parameter of said complex; and

(c) determining a fluorescence property of said sample; and

(d) comparing said fluorescence property from step (c) with a reference fluorescence property for said peptide construct, wherein said activity of said enzyme in said sample alters said light energy transfer, resulting in a change in said fluorescence property.

26. The method according to claim **25**, wherein said detector oligonucleotide has a format selected from molecular beacons, scorpion probes, sunrise probes, light up probes and TaqMan□ probes.

27. The method according to claim **23**, **24** or **25**, wherein said fluorescence property is detected in-real time.

28. The method according to claim **23**, **24** or **25**, wherein said change and said fluorescence property measured is a change in fluorescence intensity.

29. A microarray comprising a complex according to claim **19**, wherein said complex is conjugated to a solid support or to a carrier molecule attached to said solid support.

30. The microarray according to claim **29**, wherein said carrier molecule is a member selected from a nucleic acid, a peptide, a peptide nucleic acid, a pharmaceutical agent and combinations thereof.

31. The microarray according to claim **29**, wherein said solid support is divided into a first region and a second region, said first region having attached thereto a first complex, and said second region having attached thereto a second.

32. A method of providing radiation therapy to a subject requiring such therapy, said method comprising:

administering to said subject a complex according to claim **19**, said complex having radiosensitization properties; and

administering ionizing radiation to said subject, thereby providing radiation therapy to said subject.

33. A method for photodynamic therapy of a lesion or of a lesion beneath melanodermic tissue of a subject, said method comprising:

(a) administering a complex according to claim **19** to said subject; and

(b) photoirradiating said lesion.

34. The method according to claim **33**, wherein said photoirradiating is with light having a wavelength range of about 610 to about 1150 nanometers.

35. The method of claim **34** wherein the photoirradiating is with light having a wavelength range of about 730 to about 770 nanometers.

36. The complex according to claim **19**, wherein said complex comprises a component of an ink or a dye.

37. The complex according to claim **19**, wherein said complex comprises a component of a substrate for the transmission and amplification of light.

38. The complex according to claim **37**, wherein said substrate comprises a member selected from glass, organic polymers, inorganic polymers and combinations thereof.

39. A method for amplifying light transmitted by a substrate, said method comprising transmitting light through a substrate according to claim **37**, thereby amplifying said light.